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TITLE

PINE BEETLE HAZARD CONDITIONS ON THE SISTERS AREA OF THE DESCHUTES NATIONAL FOREST

By
J. M. Whiteside
Entomologist

May 1945

Forest Insect Laboratory
445 U. S. Court House
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Forest Insect Laboratory
445 U. S. Court House
Portland 5, Oregon
March 28, 1945

To: F. P. Keen, In Charge, Berkeley Laboratory

From: R. L. Furniss, Acting in Charge, Portland Laboratory

Subject: Report on hazard survey of Sisters Area

Enclosed for your review and comment is a report, "Report of a hazard survey experiment on the Sisters Area of the Deschutes National Forest" by J. M. Whiteside.

Whiteside has brought out a number of interesting points regarding pine beetle hazard on the area studied. Probably most important from the timber management standpoint is the relatively large proportion of high risk type on the area generally, and on the Tumalo and Grandview units particularly. Thus, the indications are that heavy losses will continue unless means can be devised for utilizing a major part of the high risk timber. At war's end it would certainly seem advisable for the Forest Service to adopt a system of sanitation-salvage cutting whereby large areas can be covered in a short time. We understand that plans are being laid to that end and that the results of last season's hazard survey, as reported in this report, will be used as a guide in setting up cutting priorities. It was with this use in mind that Whiteside made rather detailed recommendations unit by unit.

The enclosed copy is the original and only copy. Please return it with your comments and any others that the Berkeley staff may care to volunteer.

Enclosure

PINE BEETLE HAZARD CONDITIONS
ON THE
SISTERS AREA OF THE DESCHUTES NATIONAL FOREST

Approved by:

F. P. Keen
Entomologist, In Charge

Submitted by:

J. M. Whiteside
Entomologist

Forest Insect Laboratory
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Portland 5, Oregon
May 1945

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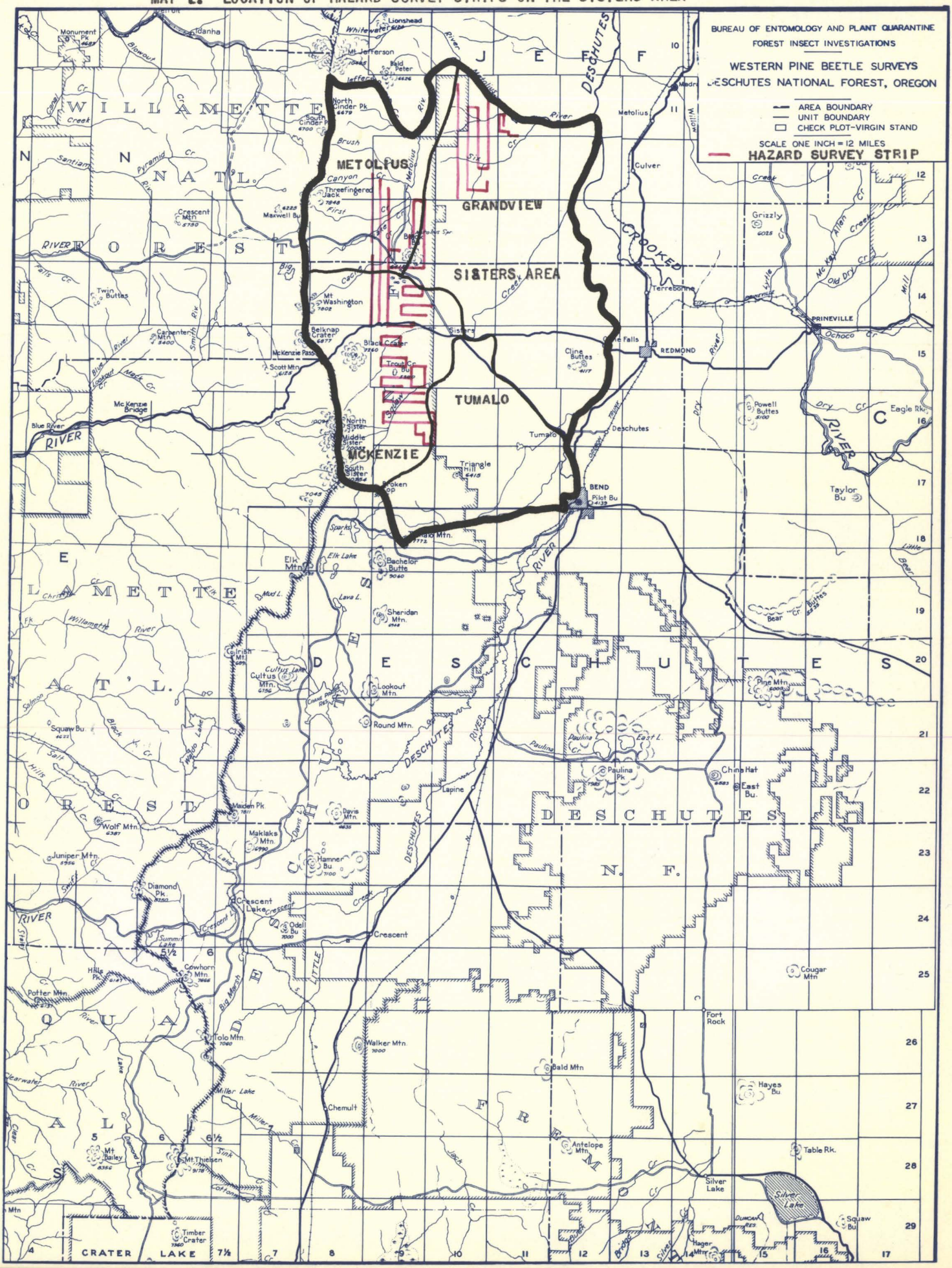
MAP 1. LOCATION OF HAZARD SURVEY STRIPS ON THE SISTERS AREA



INTRODUCTION

The role of bark beetles, particularly the western pine beetle (Dendroctonus brevicomis Lec.), as a primary factor in the destruction of valuable ponderosa pine forests is all too well known. It is generally agreed that, until recurring mortality caused by these pests has been greatly reduced, there is little hope of sustained production of ponderosa pine. The prevention and control of epidemic outbreaks of these beetles has been the major research project of the western forest insect laboratories of the Bureau of Entomology and Plant Quarantine for a long time. During recent years, encouraging progress has been made toward the solution of this important problem.

One of the most promising leads in the prevention of these epidemics is a method of "bug-proofing" a stand or forest. This is accomplished by removing - through light cutting or sanitation-salvage logging operations - those trees which are known to be susceptible to insect attack and which are most likely to be attacked in the near future. Such a cut removes a small percentage of the stand volume (the high-risk and usually high value trees) that would normally succumb to beetle attacks before regular logging operations reached the stand. At the same time, the stand is left in a healthy, vigorous condition. This method which was developed from experimental work in Northeastern California 6/ has already been tested by private companies and federal land-managing agencies in California, Oregon and Washington. To date, the results of most of these operations have been most gratifying.

It is estimated that there are approximately 5,800,000 acres of commercially valuable ponderosa pine in Oregon and Washington in need of some form of light selection cutting prior to normal operations. Such action is essential if existing values are to be utilized. However, during these war years, it is impossible to institute a program of sanitation-salvage logging commensurate with the needs of the region. As a post-war undertaking, it should have high priority in all pine management plans.

Before any program of "beetle-proofing" a stand or a forest can be initiated, it is necessary to know the relative hazard of that stand to insect attack. Information of this nature should be helpful to foresters in directing logging operations into the most hazardous areas in order to utilize present values. This type of data is best obtained from a hazard survey designed to determine the proportion of the stand most susceptible to high future insect-caused losses.

It is the purpose of this report to summarize the results of an experimental hazard survey, conducted during the summer of 1944, to rate the virgin stands of the Sisters Area of the Deschutes National Forest, Oregon according to their hazard from insect attack and to indicate the areas in need of sanitation-salvage cuttings.

PREVIOUS INVESTIGATIONS

For many years forest entomologists have recognized that ponderosa pine stands vary in their susceptibility to bark beetle attack, but it was not until 1937 that this idea was crystalized into the making of the first bark beetle hazard surveys of forested areas in northeastern California 5/. In this project some 2, 300,000 acres were intensively covered during a three-year period and the relative hazard of pine stands grouped into five broad classes. Ratings were based principally on two factors - (1) the percentage of pine volume killed in the past 12 to 15 years and (2) the percentage of high-risk volume still remaining in the reserve stands.

Subsequent to this California survey, a preliminary hazard appraisal was made by Keen in 1939 2/ of the Klamath Subregion of Oregon on the basis of data compiled from previous insect loss and timber resource surveys.

In 1941, Keen 3/ made a similar study of the Deschutes Subregion in which pine beetle hazard was determined by a combination of the following factors: forest type, site quality, elevation, volume per acre, and actual pine beetle losses during the previous 10-20 year period. A hazard zonation map was prepared which indicated the probable future hazard of the stands in the subregion during the next 10-20 years. On the Sisters Area, the largest block of high hazard timber was found to be in Ranges 10 and 11 East, Townships 11 to 17 inclusive. It was recommended that, while logging operations were progressing at a fairly rapid rate in this area, a sanitation-salvage cut of 15-20 percent of the stand volume in advance of the main logging job would save a great deal of valuable timber in the Sisters Area.

1944 HAZARD SURVEY OF THE SISTERS AREA

Why the Survey Was Undertaken

Although it was impossible to start a comprehensive hazard survey of all the ponderosa pine forests of Oregon and Washington at the present time, there was an immediate need for information on pine beetle hazard on some of the important working circles of the region. In June 1944, the opinions of the Western Pine Association, Forest Service and Indian Service were solicited to determine the areas, administered by each agency, on which such data would be most useful. As a result of these conferences, the Sisters Area of the Deschutes National Forest was one of three areas selected for experimental hazard surveys during the summer of 1944.

The hazard survey of the Sisters Area was undertaken primarily to meet two needs: the need of land-managing agencies for immediate data on pine beetle hazard andour desire to know what could be accomplished with a small force in a short period of time.

Objectives of the Survey

The specific objectives of the hazard survey on the remaining virgin stands of ponderosa pine of the Sisters Area were as follows:

(1) To try one method - the ground strip and quarter-acre sample plot - of securing data on pine beetle hazard conditions with a small crew working on one area for a limited period.

(2) To secure data on past insect-caused losses as a supplement to existing survey records.

(3) To secure data on probable future losses by determining the proportion of trees in the present stand that are highly susceptible to insect attack.

(4) To classify the stands of the area according to their relative hazard from insect attack.

(5) To prepare a hazard zonation map that might be useful in considering future forest management plans for the Sisters Area.

Accomplishments of the Survey

As shown on map 1, the actual sampling of the Sisters Area during the hazard survey was confined to a relatively small portion of the area. Most of the survey strips were run in Range 9 East, Townships 12-16 South; the remainder were in T. 10 E., T. 11, 12 S., and R. 11 E., T. 11 S.

The field work on the survey was completed in 11 days during the period from August 1 to 17, 1944 by R. L. Furniss, W. J. Buckhorn, and the writer of the Portland Forest Insect Laboratory. Mr. A. J. Jaenicke of the Forest Service assisted with the field work during part of the first week.

The physical accomplishments of the survey may be summarized as follows:

Man-days of field work	26	days
Miles of strip	161.5	miles
Miles of strip per man-day	6.2	miles
Acreage of quarter-acre line plots	619.25	acres
Number of trees classified as to risk	19,162	trees
Volume of trees classified as to risk	13,285,000	board feet
Number of snags tallied	3,046	snags
Volume of snags tallied	2,288,000	board feet

DESCRIPTION OF THE SISTERS AREA

For all practical purposes, the Sisters Area of this report corresponds to the Sisters Working Circle and the Sisters Ranger District of the Forest Service. The reporting area shown in map 1 is almost equally divided between Jefferson and Deschutes Counties and includes all ponderosa pine timberlands irrespective of ownership.

The Sisters Area occupies 30 percent of the pine acreage of the Deschutes National Forest. It is an area of rather high elevation, ranging from 3,000 feet on the Metolius River to 10,354 feet at the summit of the South Sister Mountain. All of the drainage of the area is into the Deschutes River. The soil is a loose pumice type. Extensive lava outcrops and cinder cones or buttes are common along the east slopes of the Cascade Range. It is an area of many uses, particularly recreation, with the Metolius River and Suttle Lake recreation areas being among the most popular in the state.

For reporting insect-caused losses during the regional bark beetle survey project, the Sisters Area has been divided along more or less natural topographic lines into four entomological or infestation units (map 1). The approximate acreage and volume of ponderosa pine on these four units, computed from the Forest Service Resource Survey data (1, 4) and corrected to January 1, 1944, are as follows:

Ponderosa Pine Resources (January 1, 1944)

Unit	Acreage			Virgin Pine Volume
	Virgin	Cutover	Total	Board Feet
Grandview	66,000	53,000	119,000	900,000,000
Metolius	69,000	1,000	70,000	790,000,000
McKenzie	64,000	16,000	80,000	1,150,000,000
Tumalo	17,000	54,000	71,000	260,000,000
Total	216,000	124,000	340,000	3,100,000,000

On a volume basis, the ownership of ponderosa pine in the Sisters Area in 1935 (1, 4) was as follows:

Ownership Class	Percentage of Ponderosa Pine Volume
Private	53.7
National Forest	45.0
Other Federal	1.0
State	0.1
County	0.2
Total	100 percent

The National Forest lands in the Sisters Area are administered by the Deschutes National Forest. The largest private owner in the area is the Brooks Scanlon Lumber Company. During recent years, privately owned timber, especially in the Tumalo and Grandview Units has been cut at a fairly rapid rate. As a result of land exchange agreements, the Forest Service has acquired a considerable acreage of this cutover ponderosa pine lands.

The timber from the Sisters Area is cut in four mills: at the Hitchcock and Spoo mills in Sisters, at the Titeknot mill in Redmond, and at the Brooks Scanlon mill in bend. The latter mill, being the largest, is converting most of the timber from the Sisters Area.

HAZARD SURVEY METHODS ON THE SISTERS AREA

Before the actual field work began, a forest type map of the area was brought up to date. All cutover lands were located on a 1/2 inch scale map and all sections scheduled for cutting within one or two years were plotted on an overlay sheet. Thus, the portion of the area to be sampled could be easily delineated and the project narrowed considerably.

Survey Procedure

All data were taken on quarter-acre circular plots. One plot was established and cruised every tally (330 feet) along a line, which usually followed a section line and which usually started at a section or quarter-corner. A total of 16 plots or four acres of ponderosa pine were cruised per mile of strip with the data from four plots tallied together to make four samples in each mile. For the most part, the strips were run north and south so as to cross as many drainages as possible. Distances were paced and when blazed section lines could not be followed, the lines were run with a box compass.

On each plot, two indices of bark beetle hazard were recorded: (1) the past 10-12 years mortality, as represented by standing snags, and (2) the probable future loss, as represented by those green trees showing signs of deterioration or susceptibility to insect attack in the near future. All trees and snags above 11.5 inches in diameter were recorded by two inch diameter classes. All volumes were computed from an average site quality IV volume table previously prepared by the laboratory.

Risk Classes

For the first few miles of strip, the green trees were classified according to the California four-class system of rating tree risk. However, greater refinement of definition appeared desirable and hence

Keen's unpublished penalty system of rating current health was used on practically all plots. This latter system penalizes each tree on a point basis. Current symptoms of poor health are taken into consideration according to the following criteria: unhealthy crown condition, 0 to 4 points; poor needle condition, 0 to 4 points; and weakness or injury, 0 to 8 points. Under this system, the risk of individual trees to insect attack is determined by adding the penalties against it. Thus, a minimum of 0 points and a maximum of 16 points can be counted against each tree.

In recording the field data, all green ponderosa pines falling within the limits of the sample plots were tallied in one of two groups: (1) those trees with a penalty of 0 to 4 points, which were considered as representing the low risk element in the stand, and (2) those with a penalty score of 5 to 16 points, which were considered as representing the high risk element in the stand. It is these latter trees that demand immediate attention and are the trees that should be cut under the sanitation-salvage system of logging.

Hazard Classes

In order to classify the remaining virgin stands of ponderosa pine in the Sisters Area, according to their relative degree of hazard from insect attack, five classes or degrees of hazard were used. These classes, which were based on the percentage of high-risk volume in the present stand, may be briefly described as follows:

Hazard Class	Map Color	Percent of High-Risk Volume in Present Stand	Remarks
I Very Low	Blue	0-4	Depletion none. Losses negligible.
II Low	Green	5-9	Depletion light. Losses balanced by growth.
III Moderate	Yellow	10-17	Depletion moderate. Losses moderate and expected to continue from frequent and heavy infestations.
IV High	Orange	18-26	Depletion heavy. Losses expected to continue on a large scale.
V Very High	Red	Over 26	Depletion severe. Remainder of stand threatened by expected heavy beetle activity.

Preparation of the Hazard Zonation Map

Because our surveys did not sample every section of virgin ponderosa pine in the Sisters Area, it was necessary to rely on past reports and records for clues as to the hazard in some portions of the area.

Thus it is evident that the hazard classification developed from this survey is merely an indication of the probable condition on the Sisters Area.

Although both past insect-caused losses, in the form of standing snags, and future losses, in the form of high risk trees, were measured on the line plots, primary consideration was given to the percentage of high risk volume in the present stand in preparing the hazard map. The percentage of high risk volume obtained from four quarter-acre plots was plotted on a vellum over a forest type map according to the color of the hazard class it represented. Temporary lines were then drawn around like colors. The final hazard boundary was drawn after considering the severity of past losses, topography, forest type, and our knowledge of the Sisters Area as a whole.

RESULTS OF THE HAZARD SURVEY

The results of the 1944 hazard survey on the Sisters Area will be briefly discussed first for the area as a whole and then by the four infestation units within the area.

Past Losses on the Area

Ponderosa pine mortality on the Sisters Area has been under detailed observation since 1932. Annual cruises have been made on a series of semi-permanent 320 acre check plots which serve as a basis for following pine beetle infestation trends and determining the need for direct control work. During recent years the number of plots has been reduced to seven. A summary of the average losses per acre per year on these seven plots is given in table 1.

As shown in table 1, actual losses in separated parts of the area have varied considerably; however, when compared with some of the other areas in Oregon and Washington, the losses on the Sisters Area have remained at a fairly high level for many years. Although past losses will be discussed in more detail by infestation units, it is evident that very heavy mortality has occurred and is still occurring in the southern portion of the Grandview Unit and in the Tumalo Unit. Losses on the rest of the forest have been correspondingly light.

The data on past mortality taken during the hazard survey substantiated the check plot records. Heavy past losses were found over most of the Grandview Unit, while lighter losses were found on the rest of the forest. A summary of the snag counts made on the quarter-acre sample plots is given in table 2.

Future Losses on the Area

The final product, and the ultimate objective of the hazard survey, was the zonation of the remaining virgin stands of ponderosa

pine according to their relative hazard from insect attack. This classification is best shown by the hazard zonation map.

A summary of the number and volume of high risk trees on whibh future losses are based, as found on the quarter-acre sample plots of the survey, is given in table 3.

The hazard classification of the virgin stands of ponderosa pine in the Sisters Area is shown by the four infestation units in table 4. The distribution of the five hazard classes is as follows:

Hazard Class		Acres	Percent of Remaining Virgin Pine Acreage
I	Very Low	12,400	5.8
II	Low	50,500	23.4
III	Moderate	55,000	25.4
IV	High	42,400	19.6
V	Very High	55,700	25.8
	Total	216,000	100

Over 45 percent or 98,100 acres of the remaining virgin stands on the Sisters Area are considered to be in a highly hazardous condition. Nearly 26 percent of the area is in an extremely critical condition and in need of immediate attention - if excessive ponderosa pine depletion is to be prevented. As indicated by the portions of the hazard map colored in red, there are five major problem areas of very high hazard timber on the Sisters Area. These will be discussed by infestation units in the following sections.

Hazard Conditions on the Grandview Unit

Because nearly half of the Grandview Unit has been cutover, the hazard survey was confined to the timber stands in two townships in the northern portion of the unit.

Past Losses

Over most of the Grandview Unit, ponderosa pine mortality has been high; on the southern portion of the unit it has been very heavy during recent years. The following records of the Squaw Ridge and Prairie Farm check plots are probably indicative of recent conditions in their respective portions of the unit:

Check Plot	Years	Losses Per Acre Per Year Trees	Volume (Bd.Ft.)	Percent of Original Stand Killed
Squaw Ridge	$\frac{9}{1935-1943}$	0.67	290	26.0
Prairie Farm	$\frac{7}{1937-1943}$	0.16	145	6.5

The trend of the infestation on and adjacent to the Squaw Ridge plot seems to have been influenced by the cutting that has taken place around this section. While losses in the vicinity of the Prairie Farm plot are high, the condition is not as serious as it is in the southern portion of the unit.

Future Losses

The acreage of high and low hazard timber in the Grandview Unit as determined by the hazard survey is as follows:

	Hazard Rating	Acres	Percent of Unit Acreage
II	Low	3,500	5
III	Moderate	14,500	22
IV	High	15,000	23
V	Very High	33,000	50
	Total	66,000	100

Approximately three-fourths of the remaining virgin stands in this unit are highly susceptible to excessive pine beetle losses; half of the unit is believed to be in a critical condition. On some sections of this unit, bark beetles have depleted the stand to a point where sanitation-salvage logging, for the purpose of reducing insect losses, is no longer feasible. On these sections it would be impractical to mark 'leave trees' and a utilization cut is needed in order to conserve the remaining values.

As indicated by the hazard map, a large percentage of high risk trees was found in three portions of the unit: (1) in the remaining virgin stands in Township 13 South, Range 10 East and in the Fly Creek drainage, (2)in the Six Creek drainage, and (3) in the Street Creek and Spring Creek drainages.

Recommendations

Two recommendations are offered for the treatment of the pine stands in this unit:

(1) Immediate attention should be given to the federal and privately owned virgin stands in Township 13 South, Range 10 East and in portions of the Fly Creek drainage. Pine beetles are taking a heavy toll of valuable timber in most of the sections; if the remaining values are to be utilized, most of this portion of the unit should be cutover at once. Because of the heavy past losses, a utilization cut would be

advisable in the remaining sections of this township.

(2) As soon as possible, cutting on a sanitation-salvage basis should be started in the remaining virgin stands of the unit, especially in the Six Creek, Street Creek and Spring Creek drainages.

Hazard Conditions on the Metolius Unit

The hazard survey covered a large portion of the commercially valuable stands in the Metolius Unit. As shown on the hazard map only about 1000 acres of this unit have been cutover.

Past Losses

Ponderosa pine mortality has been low over most of the Metolius Unit ever since our records began. The records on three check plots in this unit are as follows:

Check Plot	Years	Losses Per Acre Per Year Trees	Volume (Bd.Ft.)	Percent of Original Stand Killed
Allingham	1934-1943 (10)	0.09	78	5.0
Black Butte	1931-1943 (13)	0.12	80	3.7
Jack Creek	1931-1943 (13)	0.11	111	7.2

A combination of two factors has been responsible for the low endemic condition found on this unit: (1) There is a marked difference in the character of the pine stands of the Metolius Unit, as contrasted with those of the Grandview and Tumalo Units. (2) Four direct control projects during the period 1934-1941 have no doubt helped to keep pine beetle losses low. On these projects, a total of 11,730 trees have been treated by the fell-peel-burn method and most of them have been in the Metolius Unit.

Future Losses

The hazard classification of the stands of the Metolius Unit is as follows:

	Hazard Rating	Acres	Percent of Unit Acreage
I	Very Low	6,000	9
II	Low	21,000	30
III	Moderate	18,000	26
IV	High	16,000	23
V	Very High	8,000	12
	Total	69,000	100

Slightly more than one-third of the virgin pine acreage of the unit is considered to be highly hazardous to insect attack; twelve percent of the unit is in a critical condition.

Two spots of very high hazard timber were indicated by the survey: (1) on a portion of the Jack Creek drainage, and (2) on a portion of the unit between Metolius River and Green Ridge. In the Jack Creek drainage, steps are already being taken to reduce future losses. Sanitation-salvage logging, as a seasonal project, began during the winter of 1944-1945. The second spot of very high risk timber is in a difficult location. It is on a bench between the Metolius River and Green Ridge and includes a portion of an area having high recreational and summer home value, as well as part of the Metolius Natural Area.

Recommendations

(1) Since sanitation-salvage cuttings in the Jack Creek drainage are necessary and are now in progress, it is recommended that the small pocket of high risk timber in this drainage be cut as soon as possible, rather than extend the cutting over several winters.

(2) Because sanitation-salvage cuttings cannot be carried out on the Metolius Natural Area and are probably not feasible in the adjoining recreational area, it is recommended that the stands in this second spot of high risk timber be watched for signs of rising beetle losses. If direct control measures are necessary, they should be undertaken to check incipient outbreaks.

Hazard Conditions on the McKenzie Unit

Although the hazard survey strips were run only in Range 9, it is believed that a fair picture of the conditions on the McKenzie Unit was obtained.

Past Losses

During the past decade, ponderosa pine mortality over most of this unit has been low to moderate in intensity. Detailed records of pine beetle activities have been kept on one 320 acre plot since 1934. The average losses on this plot are as follows:

Check Plot	Years	Losses Per Acre Per Year		Percent of Original Stand Killed
		Trees	Volume(Bd. Ft.)	
	10			
Cold Spring	1934-1943	0.17	111	6.5

It is felt that the above record represents the condition on most of the mature ponderosa pine stands in this unit.

Future Losses

The remaining pine stands on the McKenzie Unit have been divided into the following hazard classes:

	Hazard Rating	Acres	Percent of Unit Acreage
I	Very Low	6,400	10
II	Low	26,000	41
III	Moderate	19,000	30
IV	High	11,400	18
V	Very High	1,200	1
	Total	64,000	100

When compared to the other units of the Sisters Area, the McKenzie Unit contains the smallest amount of high hazard timber. Only 19 percent of the unit, or 12,600 acres, were found to be in need of immediate attention. One percent of the unit was rated in the very high hazard class.

Recommendations

It is recommended that sanitation-salvage cuttings be initiated as soon as possible in two portions of the unit (the portions shown in red and orange on the map).

(1) In the sections surrounding Melvin and Three Creek Buttes and in the lower portion of the Squaw Creek drainage, east of Brush Draw.

(2) Along each side of the old and new Santiam highways from Sisters to Black Butte swamp. Although this situation is not pressing, a very light cut in these few sections would salvage considerable high risk, high quality timber and at the same time improve the scenic value of this important highway.

Hazard Conditions on the Tumalo Unit

Because most of the Tumalo Unit has been cutover or allocated for cutting, only a very small sector of the unit was included in the survey. However, in making the hazard map, the uncut portion of the unit, scheduled for cutting in the near future, was given a hazard rating.

Past Losses

Pine beetles have been very active in the Tumalo Unit and over most of the unit have caused heavy losses. The nine year record of the Melvin Butte check plot is probably typical of recent losses on the mature stands of the unit:

Check Plot	Years	Trees	Losses Per Acre per Yr. Volume (Bd. Ft.)	Percent of Original Stand Killed
Melvin Butte	9 1935-1943	0.31	204	15.4

Future Losses

The probable hazard rating of the remaining virgin stands of the Tumalo Unit is as follows:

Hazard Rating		Acres	Percent of Unit Acreage
III	Moderate	3,500	20
V	Very High	13,500	80
	Total	17,000	100

As shown by the above classification, and by the red areas on the hazard map, all of the remaining virgin stands of commercial importance are in need of immediate attention if serious and continued depletion is to be avoided.

Recommendations

It is recommended that sanitation-salvage operations be started at once in the remaining virgin stands of this unit. With Brooks Scanlon Lumber Company already operating in the vicinity of Three Creek Butte, it should be possible to cover the rest of the Tumalo Unit, as well as the adjoining sections of the MeKenzie Unit, is a short period.

CONCLUSIONS

As a result of the field study during the summer of 1944, two conclusions can be drawn:

First - Because of the nature of the survey, it was impossible to establish definite boundaries between the five classes of hazard. The zonation of the remaining virgin stands of ponderosa pine on the Sisters Area according to their relative hazard from insect attack, as given in this report, is intended to serve only as an indication of probable future conditions. However, it is felt that the stands needing immediate attention from a hazard standpoint have been fairly well defined.

If a utilization cut can be made in the remaining virgin stands in T. 13 S., R. 10 E. and if sanitation-salvage operations can be initiated at once in the areas shown in red on the hazard map, much valuable timber can be utilized before it is wasted by bark beetles.

Second - The ground strip - quarter acre sample plot method, as used in this experiment, is not the best procedure for making hazard surveys under existing conditions; especially when strips are run once through a section. This method yields only a minimum of essential data on which to base estimates of relative hazard from insect attack. It is also too time-consuming to be a practical method on other areas in the region at the present time. Possibly the combination of a road strip and ground strip cruise would enable us to cover an area faster and more accurately - the former to be used in quickly covering a large portion of the area and the latter to be used in obtaining data on obscured portions of the area or areas of suspected high hazard timber.

SUMMARY

The results of a seventeen day field survey to rate the remaining virgin stands of ponderosa pine on the Sisters Area of the Deschutes National Forest according to their relative hazard from insect attack are reported.

Field data were taken on quarter-acre sample plots established each 330 feet along section lines. Sixteen plots or four acres of pine were cruised per mile of strip.

All ponderosa pine snags and green trees above 11.5 inches DBH falling within the plots were tallied. The green trees were classified according to Keen's unpublished penalty system of rating current health. Trees with a total penalty score of 0 to 4 points were classified as low risk and those with a score of 5 to 16 points were considered as being the high risk element of the stand.

A hazard zonation map based on five classes of hazard was prepared. The acreage and percentage of the Sisters Area in these five classes of hazard are as follows:

	Hazard Class	Acres	Percent of Virgin Acreage
I	Very Low	12,400	5.8
II	Low	50,500	23.4
III	Moderate	55,000	25.4
IV	High	42,400	19.6
V	Very High	55,700	25.8
	Total	216,000	100

Five major problem areas of very high hazard timber in need of immediate attention were indicated by the survey. These areas and recommendations for their treatment are as follows:

(1) T. 13 S., R. 10 E. - A utilization cut should be made immediately on all remaining virgin stands.

(2) T. 16 S., R. 10 E. - Sanitation-salvage operations should be initiated at once on the remaining virgin stands.

(3) T. 11, 12, S. R. 10 E - Sanitation-salvage cuttings should be started as soon as possible in the Fly Creek, Six Creek, Spring Creek and Street Creek drainages.

(4) T. 12, 13 S., R. 9 E - A sanitation-salvage operation is under way in the Jack Creek drainage on a seasonal basis. The small pocket of very high hazard timber should be cut as soon as possible.

(5) T. 12, 13 S., R. 9 E. - Direct control operations are probably all that can be undertaken in the narrow strip of very high hazard timber between Metolius River and Green Ridge.

REFERENCES

(1) Breigleb, P. A. 1936. Forest statistics for Deschutes County, Oregon. Pacific Northwest Forest and Range Experiment Station Report, May 18, 1936.

(2) Keen, F. P. 1939. A preliminary analysis of pine beetle hazard conditions in the Klamath Subregion, Oregon. Portland Station Report, July 31, 1939.

(3) _____1941. A preliminary analysis of pine beetle hazard conditions in the Deschutes Subregion, Oregon. Portland Station Report, Dec. 19, 1941.

(4) Kemp, P. D. 1936. Forest statistics for Jefferson County, Oregon. Pacific Northwest Forest and Range Experiment Station Report, April 15, 1936.

(5) Miller, J. M., Salman, K. A., and Johnson, P. C. 1941. Bark beetle hazards in the pine stands of Northeastern California. Forest Insect Laboratory, Berkeley, California Report, May 15, 1941.

(6) Salman, K. A. and Bongberg, J. W. 1942. Logging high-risk trees to control insects in pine stands of Northeastern California. Journal of Forestry 40:533-539.

Table 1. Ponderosa pine mortality on 320 acre check plots in the Sisters Area, Deschutes National Forest.

Unit	Check Plot	Years	Losses Per Acre Per Yr.		Percent of original stand killed
			Trees	Volume	
	Squaw Ridge	9			
Grandview	T13S, R10E, Sec 27 E/2	1935-1943	0.67	290	26.0
	Prairie Farm	7			
	T12S, R10E, Sec 33 E/2	1937-1943	0.16	145	6.5
	Allingham	10			
	T12S, R9E, Sec 35 W/2	1934-1943	0.09	78	5.0
	Jack Creek	13			
Metolius	T13S, R9E, Sec 5 E/2	1931-1943	0.11	111	7.2
	Black Butte	13			
	T13S, R9E, Sec 29 E/2	1931-1943	0.12	80	3.7
	Cold Spring	10			
McKenzie	T14S, R9E, Sec 34 S/2	1934-1943	0.17	111	6.5
	Melvin Butte	9			
Tumalo	T16S, R10E, Sec 16 W/2	1935-1943	0.31	204	15.4

Table 2. Number and volume of ponderosa pine snags on quarter-acre sample plots of the hazard survey.

Unit	Acres Cruised	NUMBER OF SNAGS Total	NUMBER OF SNAGS Per Acre	VOLUME OF SNAGS (BD. FT.) Total	VOLUME OF SNAGS (BD. FT.) Per Acre	Percent of stand
Grandview	165.50	855	5.17	611,210	3,693	21
Metolius	174.00	709	4.07	482,570	2,773	11
McKenzie	269.75	1,403	5.30	1,164,390	4,317	13
Tumalo	10.00	52	5.20	29,700	2,970	14
Total	619.25	3,046	4.92	2,287,870	3,695	15

Table 3. Number and volume of high-risk ponderosa pines on the quarter-acre sample plots of the hazard survey.

Unit	Acres Cruised	HIGH RISK TREES		HIGH RISK VOLUME (BD. FT.)		
		Total	Per Acre	Total	Per Acre	Percent of stand
Grandview	165.50	472	2.85	403,520	2,438	17
Metolius	174.00	500	2.87	422,590	2,429	14
McKenzie	269.75	1,052	3.90	872,830	3,236	11
Tumalo	10.00	55	5.50	43,780	4,378	23
Total	619.25	2,079	3.36	1,742,720	2,814	13

Table 4. Summary of the hazard classification of the Sisters Area by infestation units.

Unit	Hazard Rating	Acres	% of Unit Acreage	% of Area Acreage
	II	3,500	5	1.6
	III	14,500	22	6.7
Grandview	IV	15,000	23	7.0
	V	33,000	50	15.2
	Total	66,000	100	30.5
	I	6,000	9	2.8
	II	21,000	30	9.8
Metolius	III	18,000	26	8.3
	IV	16,000	23	7.4
	V	8,000	12	3.7
	Total	69,000	100	32.0
	I	6,400	10	3.0
	II	26,000	41	12.0
McKenzie	III	19,000	30	8.8
	IV	11,400	18	5.3
	V	1,200	1	.5
	Total	64,000	100	29.6
	III	3,500	20	1.6
Tumalo	IV	13,500	80	6.3
	Total	17,000	100	7.9
Total		216,000		100
SISTERS	I	12,400		5.8
AREA	II	50,500		23.4
TOTAL	III	55,000		25.4
	IV	42,400		19.6
	V	55,700		25.8
	Total	216,000		100

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS

PINE BEETLE HAZARD ZONATION
SISTERS AREA
DESCHUTES NATIONAL FOREST, OREGON
1944

LEGEND

AREA BOUNDARY — UNIT BOUNDARY

- BEETLE HAZARD VERY HIGH — OVER 26 PERCENT OF THE STAND IN HIGH RISK TREES
  DEPLETION SEVERE AND CONTINUING. REMAINING VALUES SHOULD BE SALVAGED AT ONCE
- BEETLE HAZARD HIGH — 18-26 PERCENT OF STAND IN HIGH RISK TREES
  DEPLETION HEAVY AND EXPECTED TO CONTINUE ON LARGE SCALE
- BEETLE HAZARD MODERATE. — 10-17 PERCENT OF STAND IN HIGH RISK TREES
  DEPLETION MODERATE AND LIKELY TO CONTINUE FROM FREQUENT INFESTATIONS
- BEETLE HAZARD LOW — 5-9 PERCENT OF STAND IN HIGH RISK TREES
  DEPLETION NEGLIGIBLE. LOSSES MOSTLY BALANCED BY GROWTH
- BEETLE HAZARD VERY LOW — 0-4 PERCENT OF STAND IN HIGH RISK TREES
  DEPLETION NONE. LOSSES WILL BE NEGLIGIBLE
- NON-RESTOCKING AREAS
- CUTOVER AREAS (AS OF JANUARY 1, 1944)

SCALE 1 INCH = 4 MILES

PORTLAND FOREST INSECT LABORATORY, 445 U. S. COURT HOUSE, PORTLAND, OREGON MARCH 26, 1945

Berkeley, California
April 6, 1945

To: F. P. Keen, in Charge, Berkeley Laboratory

From: Philip C. Johnson, Entomologist

Subject: Comments on Whiteside's hazard survey report for Sisters Area

I have just reviewed Whiteside's report entitled "Report of a hazard survey experiment on the Sisters Area, Deschutes National Forest" and found it very interesting. I can certainly sympathize with Jack in the many problems which he must have met in shaping up the data for the report. The field work and computations necessary for a report of this kind are a real undertaking in these times and so I am reluctant to suggest any changes which would require further computations or entail considerable rewriting. A number of notations are included in these comments but before touching on these I would like to discuss a few points which I feel are of fundamental importance.

The first of these is concerned with the objectives. From the title one might expect a more complete discussion of the line-plot sampling technique, what data it gave and a deduction as to the practicability of the method. Instead, major emphasis in the report appears to have been given to the hazard classification, much of which was derived from data not obtained in the hazard survey. The line-plot sampling method as adapted for hazard surveys is unique and deserves more attention than is given to it here. After the reader is told that it was used, no further mention of it is made until the end of the report when it is concluded that the method is impractical.

While on the subject of practicability, I have yet to see how the cumbersome ground sampling methods can be shortened as Whiteside suggests if no sacrifices are to be made in the data which we now consider essential. If this is true, our alternative lies not in short-cut methods but in limiting the expensive ground surveys to areas of suspected high hazard where something will be done to reduce it.

The results of the hazard survey, given in the report in the form of certain statistics, appear somewhat too broad to benefit the various land owners. They could be made more specific by giving the following facts, not for the Sisters Area "in toto," but for each unit and for each hazard zone within the unit:

1. Virgin pine timber resources.
2. Percentage and volume of virgin stands already killed.
3. Percentage [redacted] stand and volume of virgin pine in high risk trees.
4. Pine timbered acreage, virgin and cutover.

Finally, I think that a brief but more detailed account of previous hazard surveys could be made in the section now entitled "Previous Investigations." No mention is made of the Klamath Basin or northern California hazard surveys, the pioneer projects in this field. In presenting an argument for testing the line-plot technique it would seem desirable to explain why the techniques of these prior projects were not adaptable or what specific improvements were to be secured from the new technique employed in the Sisters Area.

The following notations were made in reference to the text of the report:

Page 1, line 19. I cannot understand the omission of California.

Page 2, line 12. Mention was made above to the effect that the development of hazard surveys could very well be given in some detail here. This section appears to be devoted only to previous hazard work in the Deschutes Basin which, if so, is not indicated in the title for this section.

Page 3, line 1. Would insert "all" before "the ponderosa" to increase the emphasis of the last phrase in the sentence.

Page 3, line 6-12. This material appears to me to be somewhat irrelevant. Would it not be better to omit specific references to the other areas, since they will eventually be reported upon, and to say merely that the Sisters Area was one of three selected for experimental hazard surveys during 1944. No need to mention here the other areas by name, or that the indian reservation wasn't covered, or that Buckhorn will report on the Fossil Area.

Page 4, line 15. Material here could very easily be replaced by a single sentence reference to Map #1 showing the location of the strips, providing that this map showed the general location of the remaining virgin timber. The location and number of strips would then be ovious because, on Page 3 line 14, it is stated that the survey was being confined to the remaining virgin pine stands.

Page 5, line 4. "all ownerships north of Bend" can be misleading. Would suggest a new sentence beginning on line 3, "The reporting area shown in Map #1 is almost equally divided between Jefferson and Deschutes Counties and includes all virgin pine timberlands irrespective of ownership."

Page 5, line 11. The following questions might be raised regarding the ponderosa pine resource statistics which follow line 11:

(1) Are these for virgin areas only? (title more specific)
(2) Shouldn't these figures apply only to the virgin pine lands in each unit if they do not already?
(3) Is it necessary to present both sets of statistics as of 1-1-35 and 1-1-44? and if so,
(4) What is the discrepancy between the two sets due to?

Page 5a, line 9. The impression may be assumed that the Brooks-Scanlon outfit is getting most of the Sisters timber merely because it is the largest miller.

Page 6, line 17. One of the indices of hazard was stated here as the past insect-caused loss in the form of standing snags. The snags were tallied on the line-plots, yet no apparent use was made of them in the report except in Table 2 which lists only the number found. Is it correct, then, to speak of the snags as an index of hazard? Also, in reference to the snags, there is nothing to indicate the period of time during which the tallied snags were accumulated so that they might be referred to as representing a definite percentage of the pine stand as of some approximate date by the formula:

$$\%\text{ of original stand at (1944 - X yrs.)} = \frac{\text{Snags (X yrs' loss)}}{\text{Snags + Present stand}}$$

Page 6, line 25. The phrase "this wassoon abandoned" without further comment does not compliment the California system of risk rating and may give the impression that the system itself was undesirable, whereas I take it the statement may have indicated poor applicability in the Sisters Area or for the purposes of the experiment. The important fact is that the trees were risk-rated. Was the penalty system used for greater refinement, or for what reason? As stated now, the result of risk-rating is overshadowed by the somewhat controversial remarks about the two methods.

Page 7, line 19. These classes appear to be based only upon the percentage of high risk trees in the stand and, therefore, the statement that the hazard classes are similar to those used at Berkeley is questionable because the latter employed both high risk and past loss percentages.

Philip C. Johnson

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon
May 3, 1945

To: F. P. Keen and P. C. Johnson, Berkeley Laboratory

From: J. M. Whiteside (Through R. L. Furniss), Portland Laboratory

Subject: Report of Hazard Survey on the Sisters Area.

I deeply appreciate your comments on the first draft of this report. For many reasons it seemed a hard report to prepare and I do regret the delay in getting it ready for review and distribution. I have revised portions of this report, in line with your suggestions; however, because it is late, I have not attempted to improve on the broad presentation of the results of the hazard survey as Johnson has suggested (by hazard zones within the unit). If, by any chance, this revised report meets with your approval, I would like to have it typed for distribution. I have colored 10 hazard zonation maps and prepared 10 copies of map 1 (showing the survey strips) and think this number should be enough to distribute to all that might be interested in the report.

Without going into any lengthy rebuttal on your comments, I would like to briefly indicate what disposition was made of the same.

Keen's Suggestions: The omission of the California work on sanitation-salvage and hazard surveys was not intended as a "slight". I thought these works were generally well-known already and there would be no need to review them again. However, your suggested insertions on this matter are very good and I have used them "as is". I have left out the "percent of area acreage" column in discussing hazard by units, as you suggested.

Johnson's Suggestions: Your point about expecting more discussion on line plots after reading the first title is well taken. I have changed the title of this report to one more in keeping with its contents. It was an experimental survey but the fact that we did not cover every section made it necessary to derive data from other sources as well as from the line plots; hence the first title wasn't good. Incidentally, I don't think the line plot sampling method adapted for a hazard survey is unique. This method is used

on other cruising projects. It is the type of data taken that is unique.

My second conclusion on page 18, has to do with the practicability of the line plot method. I still don't think we can undertake a two-weeks hazard survey of a working circle by the ground-sampling method (which averages 6 miles per man-day) and come out with sufficient data. In talking to Buckhorn about the method used on the Umatilla, we have decided to try a combination road-strip (up to 33 miles per day) and ground strip on the Ochoco National Forest this summer. You are no doubt right in stating that we should limit expensive ground strip surveys to areas of known or suspected high hazard.

In the section entitled "Previous Investigations" I had in mind only the work previously done on the Sisters Area; however, both the title and the review were bad. I have corrected it as both you and Keen suggested. No "slight" was intended on your good work.

The question of standing snags has bothered me considerably. At first I averaged the percent of snags and the percent of high risk trees (as you did in your report) and used this average to indicate hazard. This method wasn't approved and I revised my map a second time using just high-risk trees. I still don't know what to do with the snags. Perhaps I should omit table 2 from the report and omit mentioning the snags in text.

Please accept my thanks for taking so much time in reviewing this material. Your suggestions are very valuable and greatly appreciated.

J. M. Whiteside

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Forest Insect Laboratory
341 Giannini Hall, U. C.
Berkeley 4, California

Noted by RLF

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FOREST INSECT LABORATORY
PORTLAND, OREGON

April 6, 1945

To: R. L. Furniss, Acting in Charge, Portland Laboratory

From: F. P. Keen, in Charge, Berkeley Laboratory

Subject: Report of Hazard Survey on the Sisters Area by Whiteside

I was pleased to see that Jack had gotten this report in shape for review and hope that such comments as we may have to offer will not seriously delay its final appearance.

In general I think Jack has turned out a very creditable piece of work. Looking at it from this distance I note omissions which probably would not occur to him from the near view. My comments are as follows and minor changes appear on the manuscript in blue pencil.

One of the most noticeable omissions is adequate reference to the early work in California which developed sanitation-salvage and hazard surveys. No long review of this work is needed but it should be referred to.

Page 1, line 18. Reference could be inserted here as follows: This method "which was developed from experimental work in northeastern California 2/" has also been tested by private companies and - - .

Page 2. Here some mention should be made of the California work on hazard surveys. I would suggest something along the following lines: "For many years forest entomologists have recognized that ponderosa pine stands vary in their susceptibility to bark beetle attack, but it was not until 1937 that this idea was crystalized into the making of the first bark beetle hazard surveys of forest areas in northeastern California 4/. In this work some 2,300,000 acres were intensively covered during a three-year period and the relative hazard of pine stands grouped into five broad classes. Ratings were based principally on two factors - (1) the percentage of pine volume killed in the past 12 to 15 years and (2) the percentage of high risk volume still remaining in the reserve stands.

"Subsequent to this California work, preliminary hazard appraisals were made by Keen in 1939 6/ of the Klamath subregion in Oregon on the basis of data compiled from previous insect loss and timber resource surveys.

"In 1941, Keen(1) made a similar study of the Deschutes subregion in which pine beetle hazard" was determined by a combination of the following factors: - -.

Page 11 and Table 4. The figures on "percent of area acreage" have very little meaning and it would seem to me that they could best be left out as they tend to confuse rather than clarify the situation. If anybody wanted this figure, it could be easily derived from the acreage figures in Table 4.

Page 21. The references should be arranged alphabetically.

Comments by Johnson are enclosed. These go into considerable detail as this is a subject which Johnson has done most to develop. I agree with most of Johnson's comments, but this does not mean that we expect the author to agree or else. They are submitted for his help in improving the report and I trust they will not have the effect of unduly delaying its appearance.

F. P. Keen

Enclosures

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon
July 13, 1945

To: J. C. Evenden, Entomologist, Coeur d'Alene, Idaho

From: F. P. Keen, In Charge, Portland, Oregon

Subject: Report by Whiteside - "Pine Beetle Hazard Conditions on the Sisters Area of the Deschutes National Forest"

During the summer of 1944 we made a hazard survey of the ponderosa pine stands at the Sisters Area of the Deschutes National Forest to determine pine beetle hazard conditions as well as to see what could be accomplished on this problem with a small crew. The survey was undertaken after consulting the Forest Service, Indian Service, and Western Pine Association as to areas where this type of information would be most useful.

A copy of the report is enclosed for your files. If you have any comments or criticisms of the work reported we would be pleased to have them.

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon
July 13, 1945

To: F. C. Craighead, In Charge, Forest Insect Investigations

From: F. P. Keen, In Charge, Portland, Oregon

Subject: "Pine Beetle Hazard Conditions on the Sisters Area of the Deschutes National Forest" by J. M. Whiteside

You will recall that during the summer of 1944, the Portland laboratory undertook hazard surveys on two important working circles in Oregon to determine pine beetle hazard conditions as well as what could be done with a small force working on one area at a time. The Forest Service and Western Pine Association were both interested in the conditions on the Sisters Area of the Deschutes National Forest, so this was one of the areas selected.

The enclosed report gives the results of this survey, and the map indicates those portions of the stand having different percentages of risk trees and corresponding degrees of hazard. Five portions of this area were found to be in need of immediate attention if heavy pine beetle losses are to be prevented. On most of these spots, sanitation-salvage logging operations have been recommended.

This rating of hazard differs from the one I made of the Deschutes Subregion in 1941 in that this considers primarily the percentage of risk trees present as the determining factor of hazard, while I considered both environmental pressure and stand to arrive at an integration of the various contributing and opposing factors. Which of these approaches has the most merit it is difficult to say. At least the present one gives data on percentage of risk trees in the stand and is based on field work whereas the previous study utilized existing data. In general the results of the two studies are quite similar.

Copies are being forwarded to the Forest Supervisor, the Regional Forester, and the larger timber owners involved. Comments from you and Mr. Carter will be awaited with interest.

cc: Berkeley
Coeur d'Alene

R. O. -6

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon
July 13, 1945

To: Regional Forester, R-6, Portland, Oregon, Attention: Division of Timber Management

From: F. P. Keen, In Charge, Portland, Oregon

Subject: "Pine Beetle Hazard Conditions on the Sisters Area of the Deschutes National Forest"

Enclosed is a report by J. M. Whiteside presenting the results of a pine beetle hazard survey made in 1944 of the Sisters Area of the Deschutes National Forest, which attempts to zone the remaining virgin stands according to their relative hazard from insect attack. Five hazard zones are recognized depending largely upon the percentage of high-risk trees found in the stand, but modified to some extent by site and general environmental conditions. A somewhat different basis of appraising hazard was used in my analysis of December 10, 1941, but the results of the two studies are essentially the same in their practical aspects.

Particularly high hazard areas appear in uncut stands of the Tumalo Unit and the Grandview Unit, while one sizeable area of high hazard timber was found in the center of the Metolius Unit. Selection cutting of these areas to remove high hazard elements of the stand should proceed as rapidly as possible. Sanitation-salvage beetle control logging should be considered for these areas if heavier cuts are to be long delayed.

A copy of this report is being sent to the Forest Supervisor and to the Brooks Scanlon Lumber Company.

cc: Forest Supervisor

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon
July 13, 1945

Mr. Stuart Moir, Forester
Western Pine Association
Yeon Building
Portland, Oregon

Dear Stuart:

Enclosed is a report by J. M. Whiteside presenting the results of a pine beetle hazard survey made in 1944 of the Sisters Area of the Deschutes National Forest, which attempts to zone the remaining virgin stands according to their relative hazard from insect attack. Five hazard zones are recognized depending largely upon the percentage of high risk trees found in the stand, but modified to some extent by site, and general environmental conditions. A somewhat different basis of appraising hazard was used in my analysis of December 10, 1941, but the results of the two studies are essentially the same in their practical aspects.

Particularly high hazard areas appear in uncut stands of the Tumalo Unit and the Grandview Unit, while one sizeable area of high hazard timber was found in the center of the Metolius Unit. Selection cutting of these areas to remove high hazard elements of the stand should proceed as rapidly as possible. Sanitation-salvage beetle control logging should be considered for these areas if heavier cuts are to be long delayed.

A copy of this report is enclosed for Mr. George Schroeder and one is being sent to the Brooks Scanlon Lumber Company.

Sincerely yours,

F. P. Keen
Entomologist, In Charge

Forest Insect Laboratory
445 U. S. Court House
Portland, Oregon
July 13, 1945

Mr. A. J. Glassow, General Manager
Brooks Scanlon Lumber Company
Bend, Oregon

Dear Mr. Glassow:

During the summer of 1944 this laboratory made a survey to determine pine beetle hazard conditions in the ponderosa pine stands of the Sisters Area of the Deschutes National Forest. This area is the same as the Sisters Working Circle and because your company owns timber and is now operating in this area, we thought you might be interested in the results of this survey. For that reason we are sending you a copy of a report summarizing the results.

Five portions of the Sisters Area were found to be in need of immediate attention if heavy insect-caused losses are to be prevented. On most of these, sanitation-salvage logging operations have been recommended.

We trust that you will find this report of some interest and shall be glad to have your comments on the same.

Sincerely yours,

F. P. Keen
Entomologist, In Charge

cc: Forest Supervisor

458.3
JNAW
W.J.B

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

WASHINGTON, D. C.

V

C
O
P
Y

Agricultural Research Center
Beltsville, Maryland
July 30, 1945

To: F. P. Keen, 341 Giannini Hall, U. C. Berkeley, Calif.

From: L. W. Orr, Senior Entomologist, Forest Insect Investigations, (through F. C. Craighead)

Subject: Pine Beetle Hazard Conditions on the Sisters Area of the Deschutes National Forest by J. M. Whiteside

Dr. Craighead has suggested that I review Whiteside's report which was received with your letter of July 13. This report should be of considerable value to the timber owners in their planning of cutting operations for future years, providing they keep in mind the fact that the recommendations contained in the report are based on a relatively small sample of the total area. On the other hand, I believe this is an areawhere you have more general information about stand conditions, as a result of other studies, than would be true formuch of the rest of the ponderosa pine area in Oregon and Washington. The fact that such a report could be prepared for the Sisters Area after only 11 days field work by 3 or 4 men should not be taken as an example of what can be expected if other units are to be covered later on.

I was puzzled by the statements in the first paragraph on page 9. Why should the losses on the squaw Ridge plot be influenced by cutting operations on the surrounding area? Was this because of a buikd-up of beetles in slash?

When a stand has been drastically thinned by beetles do you expect losses to continue or could you logically expect the remaining trees to pick up in vigor and perhaps move into a lower risk class? A utilization cut is recommended for the Grandview Unit, apparently because 73% of the acreage is given a hazard rating of Very High based on past losses. I note that it is stated that "a large percentage of high risk trees was found in three portions of the unit", which I suppose answers my above question.

Do you feel that your penalty system of rating current health is practical for this type of survey? Wouldn't it be quicker to simply assign the trees in two groups - low risk and high risk - and achieve greater accuracy in the survey by covering more ground or sampling a larger proportion of the stand.

2-F.P. Keen-July 30, 1945

I, of course, know very little about this type of work and am therefore asking these questions for my own information and not to be critical of the report.

458.3

File No. _____

Noted by RLF

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

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PORTLAND, OREGON

Forest Insect Laboratory
341 Giannini Hall, U.C.
Berkeley 4, California

August 24, 1945

To: L. W. Orr, Forest Insect Investigations, Beltsville, Maryland (through Dr. F. C. Craighead)

From: F. P. Keen, in Charge, Berkeley Laboratory

Subject: Pine Beetle Hazard Conditions on the Sisters Area of the Deschutes National Forest by J. M. Whiteside

We were glad to have your comments on Whiteside's report of the Sisters Area hazard survey. This attempt at a field hazard appraisal was something of an experiment and while the results are quite in line with previous surveys, both Whiteside and I recognize certain weaknesses in procedure. These methods were improved in the hazard survey subsequently made of the Umatilla National Forest by Furniss and Buckhorn (not as yet reported) and were further improved in the recent hazard survey of the Snow Mountain Area of the Ochoco National Forest on which I joined Whiteside and Buckhorn last week.

Any hazard appraisal in virgin ponderosa pine stands has to be applied with quite a broad brush, for its usefulness is not a matter of relative hazard of individual sections but of large blocks and working circles. Therefore it is not necessary to make an intensive cruise but rather an extensive one and to supplement this with all the information available on timber types, sites, life zones, stand volumes and past losses. The final hazard appraisal is the product of environmental pressure working upon susceptible stands.

The steadily increasing losses on the Squaw Ridge plot have been mentioned before. From 105 board feet per acre in 1937, annual losses have steadily mounted to 455 board feet per acre or 6.27 percent of stand in 1941 and 437 board feet per acre in 1942. I don't have the more recent figures here nor the date of adjacent cutting, but it appears that the mature stand on this section is simply going to pieces in spite of generally improved moisture conditions and low loss in the region as a whole. I, too, am greatly puzzled to explain what the nearby cutting had to do with it - maybe merely starting it off. I don't think the build-up of beetles in slash had much to do with it - certainly not its increasing tendencies.

When stands have been drastically thinned by beetles, the remaining stand is usually of a lower hazard rating but frequently this process of stand deterioration proceeds to its ultimate conclusion - over 90 percent destruction of the overstory and conversion of the stand to one made up largely of young immature saplings and poles.

In this hazard survey, trees were simply assigned to the two groups you mention - low risk and high risk. The penalty system was used merely to determine where to draw the dividing line between these two groups, i.e. (1) "low risk" - penalties 0-4 and (2) "high risk" - penalties 5 or more. This division places in the high risk group all California "risk 4" trees and about the upper one-third of "risk 3."

I think Whiteside and Buckhorn will have a very interesting report of the Snow Mountain hazard survey in which we have worked out a formula for integrating the factors of life zone, site, stand volume and past losses with present percentage of risk trees found in the stands. But first of all they expect to release their risk map as the Forest Service wants to make immediate use of it in connection with advertising sales on a light cut "sanitation-salvage" basis.

It is too bad that our basic studies on the relationship of various hazard factors and their influence on future losses were not completed prior to the demand for practical hazard zonation surveys. We have already covered much of the pine region with hazard surveys without actually knowing how to evaluate and integrate the influence of these various independent factors. I am hoping some day to complete the studies which Grant and I started in 1941 on this problem.

cc: Portland ✓

F. P. Keen